



Published in final edited form as:

Prev Med. 2018 September ; 114: 107–114. doi:10.1016/j.ypmed.2018.06.018.

Nicotine and addiction beliefs and perceptions among the US-born and foreign-born populations[★]

Anh B. Nguyen^{a,*}, Xiaoquan Zhao^{a,b}, Leah Hoffman^a, Aura Lee Morse^a, and Janine Delahanty^a

^a Center for Tobacco Products (CTP), Food and Drug Administration, Silver Spring, MD, USA

^b Department of Communication, George Mason University, Fairfax, VA, USA

Abstract

Little is known about nicotine and addiction beliefs held by those who are foreign-born in the US and how these beliefs are associated with acculturation and race/ethnicity. This study attempts to address these research gaps. Data were analyzed from two cycles of the Health Information National Trends Survey, HINTS-FDA 2015 ($n = 3738$) and HINTS-FDA 2017 ($n = 1736$). HINTS-FDA is a tobacco-focused, cross-sectional, nationally representative survey of US non-institutionalized civilian adults aged 18 years or older. We first assessed associations between foreign-born status and beliefs about nicotine and addiction using weighted chi-square analyses. Then, using only the foreign-born sample, we examined the associations of nicotine and addiction beliefs with race/ethnicity and acculturation (i.e., English proficiency and U.S. tenure) using weighted multiple linear regression. Results showed that, compared to US-born respondents, foreign-born respondents were more likely to be concerned with being addicted to nicotine and to believe that low nicotine cigarettes would have much lower lung cancer risk than a typical cigarette. Among the foreign-born, NH-Black and Hispanic respondents were more likely to see low nicotine cigarettes as harmful and addictive compared to NH-White respondents. The relationship between acculturation and nicotine beliefs was complex with lower acculturation associated with elevated misperceived risk of nicotine and also ratings of addictiveness. Further research among key subpopulations may inform communication, education and dissemination strategies, especially among vulnerable populations.

Keywords

Tobacco; Nicotine; Risk perceptions; FDA regulation; Foreign-born status

[★]Note. The views and opinions expressed in this manuscript are those of the authors only and do not represent FDA/CTP position or policy.

^{*}Corresponding author at: U.S. Food and Drug Administration, Center for Tobacco Products, Office of Science, 10903 New Hampshire Avenue, Building 71, Room G335, Silver Spring, MD 20993-0002, USA. Anh.Nguyen@fda.hhs.gov (A.B. Nguyen).

Conflict of interest

The authors declare there is no conflict of interest.

1. Introduction

The US demographic profile is projected to become much more diverse in coming years. Currently, non-Hispanic Whites (NHWs) account for more than 60% of the total population; however, by 2044, the US will become a “majority-minority” nation, with NHWs remaining the single largest racial/ethnic group but comprising less than 50% of the nation’s total population (Colby and Ortman, 2014). In addition, the foreign-born population is rapidly growing. In 2015, the US foreign-born population reached 43.2 million, accounting for 13.4% of the general US population (Lopez and Bialik, 2017). Foreign-born individuals are defined as individuals residing in the United States who were not born in the US and were not US citizens at birth (U.S. Census Bureau, n.d.). The foreign-born population is projected to grow to 78 million by 2060, reflecting an 80% increase from 2015 (Colby and Ortman, 2014). This study seeks to study tobacco harm and addiction beliefs held by the foreign-born as our understanding of tobacco health beliefs among this population is limited.

1.1. Foreign-born populations and smoking behavior

Findings on foreign-born health vary across health outcomes, demographics, socioeconomic status, and other cultural factors (Castaneda et al., 2015). However, many studies have reported the so-called “healthy immigrant effect,” with foreign-born individuals showing better health outcomes compared to their US-born counterparts (Argeseanu Cunningham et al., 2008). A similar pattern is also found in tobacco use studies as foreign-born individuals generally display lower smoking prevalence compared to their US-counterparts (Baluja et al., 2003; Lariscy et al., 2013; Wade et al., 2013). However, the relationship between foreign-born status and smoking behavior is complicated and can vary based on factors such as gender, country of origin, race/ethnicity, acculturation, and the intersections of these factors (Bethel and Schenker, 2005; Kim et al., 2007; National Cancer Institute, 2017; Reiss et al., 2015).

Foreign-born smoking behavior is associated with acculturation (i.e., the process through which immigrants gradually adapt to the culture, values, and customs of the host country through contact with the native population) (Berry et al., 2011). While some studies employ multi-item acculturation measures, it is also common to see proxy indicators of acculturation in the literature such as length of residence in the US and English language proficiency (Bethel and Schenker, 2005; Kim et al., 2007; Wallace et al., 2010). Much research on acculturation and smoking behavior is conducted among the Hispanic and Asian foreign-born populations (National Cancer Institute, 2017). Studies on the Hispanic population report a positive relationship between acculturation and cigarette smoking (i.e., as Hispanic foreign-born individuals become more acculturated, smoking prevalence increases) (Bethel and Schenker, 2005; Lorenzo-Blanco et al., 2015; Wilkinson et al., 2005), although the reverse pattern has also been observed in other studies (Cantrell, 2014; Cooper et al., 2011). For Asian foreign-born individuals, research suggests that acculturation is negatively associated with cigarette smoking among Asian men and positively associated with smoking among Asian women (Kim et al., 2007; Choi et al., 2008). Overall, it appears that acculturation plays an important but complex role in smoking behavior among the foreign-born, contributing to either increased or decreased risk depending on racial/ ethnic

membership. Despite epidemiological evidence about smoking behaviors, less is known about the foreign-born population's beliefs about tobacco use, and specifically, nicotine.

1.2. Nicotine beliefs

Research shows that the public holds inaccurate nicotine beliefs. Previous studies indicate that perceptions of nicotine include the belief that nicotine causes cancer (Bansal-Travers et al., 2010; Cummings et al., 2004; O'Brien et al., 2017; McQueen et al., 2014), that using nicotine in any form is as bad as smoking (Heavner et al., 2009), that lower nicotine content (LNC) and "light" cigarettes are less addictive and harmful than regular cigarettes (Cummings et al., 2004; O'Brien et al., 2017; Denlinger-Apte et al., 2017; Talhout et al., 2018) and can improve one's chances of quitting smoking (Bansal-Travers et al., 2010). It is important to note that while very low nicotine content (VLNC) cigarettes reduce the nicotine content of cigarettes to minimally addictive levels that may reduce tobacco dependence (Food and Drug Administration, 2017; Tidey et al., 2016; Tidey et al., 2013; Hatsukami et al., 2017), VLNC cigarettes are distinct from (a) LNC cigarettes that have less dramatic reductions of nicotine and are not less addictive than regular cigarettes (Hatsukami et al., 2010; Dermody et al., 2015) and (b) "light" cigarettes with design features such as increased ventilation that produce low nicotine yields in machines but do not actually reduce the nicotine content in cigarette tobacco (Talhout et al., 2018; Benowitz and Henningfield, 2013; Donny et al., 2014). Due to these beliefs, nonsmokers may be willing to experiment with LNC or "light" cigarettes as research suggests that consumers believe lower nicotine products to pose lower cancer, heart disease, stroke, and addiction risk compared to regular cigarettes (Denlinger-Apte et al., 2017). A systematic review by Pfeffer and colleagues examined smokers' understandings and lay beliefs about addiction to smoking and nicotine (Pfeffer et al., 2017). Findings indicated that most smokers believe that smoking is addictive and that they are addicted to cigarettes. However, it was noted that most of the quantitative studies examined addiction in the context of smoking or cigarettes while little is known about perceptions of the role of nicotine in addiction. This analysis will attempt to address this important research gap.

US studies on knowledge and beliefs about tobacco use among those who are foreign-born have largely focused on tobacco harm perceptions. In general, those who are foreign-born can correctly identify the association between smoking and increased risk of major chronic diseases (Chan et al., 2007; Kim et al., 2000; Maxwell et al., 2007). Research gaps remain, however, about foreign-born beliefs on nicotine and addiction. One study by Zinser et al. (2011) surveyed a group of non-Latino and Latino adult smokers, including foreign-born Latino smokers, in Colorado and found that compared to non-Latinos, Latino adult smokers were significantly less likely to endorse the belief that, "People who smoke cigarettes regularly are addicted to nicotine" and significantly more likely to endorse the belief that nicotine causes cancer, indicating inaccurate nicotine beliefs among the Latino sample. However, because the sample of Latino smokers in the study was not restricted to the foreign-born (66% of the respondents were born in the US), these results cannot be generalized to the foreign-born population. Overall, the literature on foreign-born nicotine and addiction beliefs is still in its nascence. This analysis will attempt to address this important research gap.

The current analysis examines associations between foreign-born status and nicotine and addiction beliefs. The analysis objectives are (1) to describe and compare nicotine and addiction beliefs between USborn respondents and foreign-born respondents; and (2) to examine the role of race/ethnicity and acculturation in nicotine and addiction beliefs among the foreign-born.

2. Method

2.1. Participants and design

The Health Information National Trends Survey (HINTS) is a cross-sectional nationally-representative survey which has been administered by the National Cancer Institute (NCI) since 2003. The HINTS population is adults aged 18 years or older in the civilian non-institutionalized US population. HINTS-FDA cycles are special cycles of data collection conducted by NCI in partnership with FDA to combine the traditional HINTS topics with additional tobacco-relevant modules. We tested for differences in socio-demographic characteristics, current smoking status, and foreign-born status for the HINTS-FDA 2015 and HINTS-FDA 2017 cycles. Because the two cycles were similar, data from the HINTSFDA 2015 ($n = 3738$) and HINTS-FDA 2017 ($n = 1736$) were combined for the current study (total $N = 5474$). Data were collected in both cycles through self-administered mail surveys sent to a sample of residential addresses; survey items were identical across both cycles. The weighted response rate was 33% in 2015 and 34% in 2017. All households received materials in English unless Spanish materials were requested. Out of 5474 questionnaires, 42 (1.5%) were completed in Spanish. Additional methodological information is available elsewhere (Westat, 2015; Blake et al., 2016; Westat, 2017).

2.2. Measures

2.2.1. Beliefs and perceptions about nicotine and addiction—Three items assessed nicotine beliefs: “Nicotine is the main substance in tobacco that makes people want to smoke,” “The nicotine in cigarettes is the substance that causes most of the cancer caused by smoking,” and “Addiction to nicotine is something that I am concerned about.” Response categories included *Strongly disagree*, *Disagree*, *Agree*, *Strongly agree*, and *Don’t know*. One item assessed perception of cigarette addiction, “Overall, how addictive do you believe each of the following is?... Cigarette smoking.” Responses included *Not at all addictive*, *Moderately addictive*, *Very addictive*, and *Don’t know*. Four items assessed low nicotine cigarette beliefs, and respondents rated whether a cigarette advertised as “low nicotine” would: (1) be more or less harmful than a typical cigarette; (2) have lower or higher risk of causing lung cancer than a typical cigarette; (3) be more or less addictive than a typical cigarette; and (4) be believable. Items 1–3 had five response options that ranged from [*Much less/Much lower than a typical cigarette to Much more/Much higher*] than a typical cigarette, with a midpoint of *Equally [harmful/risky/addictive]*. Item 4 responses included *Not at all believable*, *A little believable*, *Somewhat believable*, and *Very believable*.

2.2.2. Foreign-born status—This was assessed by the item “Were you born in the United States?” Respondents were categorized as foreign-born if they answered no and as US-born if they answered yes.

2.2.3. Racial/ethnic identity—This item reflects combined response categories from one item that assessed ethnicity (“Are you of Hispanic, Latino/a, or Spanish origin?”) and one item that assessed (“What is your race?”). The combined response categories included one Hispanic category and four non-Hispanic (NH) categories: White, Black, Asian and Pacific Islander (API), and Other (including American Indian, Alaska Native, and multiple races). For multivariate analyses, API and Other were combined due to small samples.

2.2.4. Acculturation—Following examples in the literature (Bethel and Schenker, 2005; Kim et al., 2007; Wallace et al., 2010), acculturation was measured with two proxy indicators. One assessed English proficiency, “How well do you speak English?” Response categories were *Not at all*, *Not well*, *Well*, *Very well*. Another assessed length of residency in the US or US tenure, “In what year did you come to live in the United States?” We calculated the total number of years respondents had resided in the U.S. at the time of survey completion and recoded into three levels: 1–10 years, 11–20 years, and > 20 years, following similar strategies by other studies (Nguyen et al., 2010; Yang et al., 2011; Yao and Hillemeier, 2014).

2.2.5. Socio-demographic characteristics—Demographic variables included age (four levels: 18–24; 25–44; 45–64; 65+ years), sex (male; female), health insurance status (insured; not insured), urban/rural status, marital status (recoded into three categories: single, never been married; married/living with a partner; widowed/separated/divorced), and educational attainment (recoded into four levels: less than high school diploma/high school graduate/GED; some college/vocational or technical training; college graduate; postgraduate); household income (five levels: \$19,999, \$20,000–49,999; \$50,000–74,999; \$75,000–99,999; \$100,000); and HINTS-FDA cycle (two levels: 2015; 2017).

2.2.6. Current smoking status—Consistent with past research, respondents were classified as current smokers if they smoked at least 100 lifetime cigarettes (i.e., ever smoker) and now smoke every day or some days (Hu et al., 2016). Respondents were classified as former smokers if they had smoked at least 100 lifetime cigarettes and currently did not smoke at all and as never smokers if they had smoked fewer than 100 lifetime cigarettes (Bonhomme et al., 2016; Fagan et al., 2007).

2.3. Data analysis

Analyses were conducted using SAS 9.3 and SAS-callable SUDAAN 11.0. Analyses used jackknife replicate weights to generate nationally representative estimates and to account for the complex sampling design (Westat, 2015). Associations were assessed between foreign-born status and other variables of interest (demographic variables, current smoking status, and beliefs about nicotine and addiction) using weighted chi-square analyses. Weighted multiple linear regression analyses were restricted to the foreign-born sample and regressed nicotine and addiction beliefs on race/ethnicity, English proficiency, and U.S. tenure. For these analyses, “don’t know” responses to nicotine belief items were excluded.¹ Additional significant bivariate correlates ($p < 0.05$) of nicotine belief items were selected as control variables and adjusted for in the regression models. Missing data were handled by listwise deletion. In the reported findings, counts are unweighted while proportions are weighted.

3. Results

3.1. Demographic characteristics and current smoking status of US-born vs. foreign-born

Of the sample, 486 (14%) were foreign-born. As Table 1 shows, foreign-born respondents were significantly more likely to be male (58% foreign-born vs. 47% US-born), Hispanic (40% foreign-born vs. 11% US-born), NH-Other (30% foreign-born vs. 4% US-born), college graduates (33% foreign-born vs. 20% US-born), post-graduates (19% foreign-born vs. 12% US-born), and married or living with a partner (69% foreign-born vs. 54% US-born) compared to the US-born. Compared to US-born respondents, foreign-born respondents had a significantly smaller proportion of those who spoke English ‘very well’ (55% foreign-born vs. 95% US-born). In addition, foreign-born respondents had a significantly greater proportion of never smokers (72% foreign-born vs. 59% US-born) and smaller proportion of former smokers (18% foreign-born vs. 25% US-born) than US-born respondents. There were no differences in proportions of current smokers.

3.2. Nicotine perception and beliefs

Compared to US-born respondents, foreign-born respondents had a lower proportion of those who disagreed (5% foreign-born vs. 14% US-born) and higher proportion of those who strongly agreed (37% foreign-born vs. 27% US-born)² with the belief *Addiction is something I am concerned about*. In addition, a higher proportion of those who are foreign-born believed low nicotine cigarettes would have much lower risk (18% foreign-born vs. 2% US-born) of causing lung cancer than a typical cigarette compared to those US-born. Refer to Table 2.

3.3. Correlates of nicotine perception and beliefs among the foreign-born

Table 3 shows multivariate models with significant findings. Among the foreign-born, compared to NH-White respondents, NH-Black ($B = 0.62$; 95% CI = 0.04; 1.19) and Hispanic ($B = 0.56$; 95% CI = 0.12; 1.00) respondents were more likely to believe that an LNC would be more harmful; NH-Black ($B = 0.72$; 95% CI = 0.14; 1.31) and Hispanic ($B = 0.48$; 95% CI = 0.12; 0.84) respondents were also more likely to believe that LNC would be more addictive than a regular cigarette. In addition, NH-Black ($B = -0.61$; 95% CI = -1.04 ; -0.18) respondents were less likely to believe that cigarette could be “low nicotine” compared to NH-White respondents. Among the foreign-born, those who spoke English “well” ($B = 0.43$; 95% CI = 0.13; 0.74) were more likely to believe that the nicotine in cigarettes is the substance that causes most of the cancer caused by smoking compared to those who spoke English “very well.” Respondents who had lived in the US for 11–20 years ($B = 0.17$; 95% CI = 0.06; 0.32) were more likely to report higher ratings of addictiveness for cigarette smoking compared to respondents who had lived in the US for > 20 years.

¹We tested for statistical differences in demographic traits, acculturation, and smoking status between those who answered “don’t know” (DK) vs. all other responses (Other) for items relevant to beliefs and perceptions of nicotine and addiction. Findings did not indicate consistent differences among the DK and the Other with one exception: never smokers were more likely to answer DK compared to current and former smokers.

²The 95% confidence intervals for foreign-born and US-born respondents slightly overlapped for this comparison.

4. Discussion

The current study examines nicotine and addiction beliefs among US adults. Our findings indicate that approximately half of the population incorrectly believes that nicotine is the main carcinogenic substance in cigarette smoke, aligning with findings from previous research (Bansal-Travers et al., 2010; Cummings et al., 2004; O'Brien et al., 2017; McQueen et al., 2014). This pattern of findings suggests that continued effort is needed to educate the general US population on the role of nicotine in tobacco-related harm.

This study sought to fill an important research gap on the relationship between foreign-born status and beliefs about nicotine and addiction. Our study findings extend what is known about nicotine and addiction beliefs among consumers by showing that compared to the US-born, the foreign-born were more likely to believe that low nicotine cigarettes would have much lower risk of causing lung cancer compared to a typical cigarette. As those who are foreign-born are a minority in the US, studies on nicotine-related beliefs among other minority groups may be relevant as cultural participation and identity may influence beliefs. For example, in one study, compared to non-Latino smokers, Latino smokers were more likely to endorse the carcinogenic role of nicotine and less likely to recognize the addictive properties of nicotine in cigarette smoking (Zinser et al., 2011).

Our findings indicate that, compared to US-born respondents, foreign-born respondents were more likely to be concerned about being addicted to nicotine. Although significant variation exists by country of origin, foreign-born individuals generally have lower smoking prevalence compared to their US-born counterparts (Baluja et al., 2003; Lariscy et al., 2013; Wade et al., 2013). It is possible that an underlying reason for the foreign-born group's concern for nicotine addiction may be due to inaccurate beliefs about the role of nicotine in tobacco products (e.g., the belief that nicotine causes cancer). Such beliefs may initially protect them from smoking uptake. But as acculturation grows among the foreign-born, this may lead to increasing tobacco use for many immigrant groups (Wade et al., 2013; Wallace et al., 2010; Colby and Ortman, 2014). Among foreign-born smokers, those who continue to hold onto misperceptions of the role of nicotine may experience low quitting success due to reluctance in switching to nicotine replacement therapy (NRT). Broadly, perceptions of the role of nicotine in the domains of health and addiction have been recognized as source of influence on cessation or switching to alternative nicotine-containing products among smokers (Pfeffer et al., 2017). A study found that beliefs not conducive to NRT use ("NRT is as bad as cigarettes," and "I'd be worried about getting hooked on NRT") were higher among Latino adult smokers than non-Latino adult smokers (Zinser et al., 2011). Studies have also shown that ethnic minority smokers' concerns about NRT side effects (e.g., worries about accumulation of nicotine in the body) and perceived ineffectiveness may serve as barriers to smoking cessation (Fu et al., 2007; Tsang et al., 2014). In addition, foreign-born never smokers may be willing to try products marketed as low nicotine, believing LNC or "light" cigarettes products to be safer. Understanding the foreign-born population's nicotine beliefs may inform targeted messaging and education dissemination strategies regarding the role of nicotine on addiction and dependence, as well as tobacco-related chronic diseases.

This study examined the role of important correlates of nicotine and addiction beliefs among the foreign-born, including race/ethnicity. Our findings indicated that NH-Black and Hispanic respondents were more likely than their NH-White peers to believe that a low nicotine cigarette would be more harmful and more addictive than a regular cigarette while NH-Black respondents were less likely to believe that a cigarette could be low nicotine compared to NH-White respondents. The results are consistent with previous literature that demonstrates that racial and ethnic minorities are more likely to be cautious in their judgements about nicotine. For example, O'Brien et al. (2017) found that respondents who were non-White were more likely to believe that nicotine causes cancer but less likely to believe that reducing the nicotine in cigarettes would result in a less harmful or addictive product than a regular cigarette compared to White respondents. In addition, research suggests that racial/ethnic minority groups have historical distrust of the medical profession and health care organizations (Armstrong et al., 2008; Halbert et al., 2006; Boulware et al., 2003). Such distrust may also heighten suspicion of educational messaging on nicotine.

Our study findings demonstrate the complex role of acculturation in nicotine and addiction beliefs. Concerns about nicotine addiction were more prevalent among foreign-born individuals with lower levels of acculturation (e.g., shorter US residency was associated with higher ratings of addictiveness for cigarettes); this is possibly due to the inaccurate beliefs about the harms of nicotine held among foreign-born individuals with lower levels of acculturation (e.g., foreign-born participants with lower English proficiency were more likely to believe that the nicotine in cigarettes is the substance that causes most of the cancer caused by smoking compared to those with higher English proficiency). With increasing acculturation and the related increased social normative influence of the host culture, foreign-born individuals may harmonize their overall attitudes towards nicotine with that of mainstream US culture, the culture of their racial and ethnic minority group in the US, or a combination of the two. Acculturation's impact on nicotine-related attitudes may, in turn, result in increased risk for tobacco use among the foreign-born (National Cancer Institute, 2017). Conversely, as previously noted, acculturation may also result in increased receptiveness to nicotine-replacement therapy among foreign-born tobacco users. Our findings on acculturation offer a nuanced perspective on the "healthy immigrant effect," suggesting that multiple and potentially countervailing processes may be at work as immigrants gradually adapt their tobacco-related beliefs and behaviors to the host culture. Identifying these processes will add theoretical depth to the concept of the "healthy immigrant effect" and put acculturation at a more central position in research and practice addressing tobacco-related disparities.

Several study limitations should be considered when interpreting findings. The HINTS-FDA data are cross-sectional in nature and do not permit causal inferences. Additionally, we relied on available single-item measures of language proficiency and length of residence to assess acculturation. The ability of these measures to capture the full scope and richness of the concept of acculturation is limited. For nicotine and addiction belief items, we excluded *don't know* responses. Because never smokers were more likely to answer *don't know* responses compared to former and current smoker, findings should be interpreted with caution. Recruitment strategies did not target more categories of ethnic membership (e.g., Filipino or Chinese membership) therefore we were unable to assess more granular ethnic

categories as well as current smoking status among the foreign-born. Most respondents completed the survey in English, likely contributing to the large proportion of foreign-born respondents with higher English proficiency and longer US tenure. Thus, we were unable to address the significant heterogeneity in the foreign populations in the current analysis. Because HINTS-FDA does not capture US citizenship, US citizens born abroad are potentially misclassified as foreign-born individuals though this number is likely to be negligible.

Despite these limitations, we believe that the examination of immigrant status in the domain of tobacco knowledge and beliefs has contributed important new evidence to the body of literature on social determinants in health (Castaneda et al., 2015). In addition, our findings can help inform culturally targeted tobacco public education efforts in reaching diverse foreign-born populations. Culturally-tailored messaging that targets important beliefs and values of specific groups is effective in health promotion such as smoking cessation (Matthews et al., 2009; Wu et al., 2009). Messaging efforts that target different health information channels perceived as legitimate and trusted by specific populations (Nguyen et al., 2017), are delivered in the primary language of the specific population (Fang et al., 2006), and use culturally-meaningful imagery and content (Nevid and Javier, 1997) will strengthen and reinforce accurate nicotine messaging among these diverse populations.

In conclusion, this study fills a research gap by shedding light on the relationship between foreign-born status and nicotine and addiction beliefs. Findings show that the foreign-born hold inaccurate nicotine and addiction beliefs varying by race/ethnicity and acculturation. These findings can inform education and dissemination strategies to prevent misperceptions of nicotine, especially among vulnerable populations.

Acknowledgments

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- Argeseanu Cunningham S, Ruben JD, Narayan KM, 2008 Health of foreign-born people in the United States: a review. *Health Place* 14 (4), 623–635. [PubMed: 18242116]
- Armstrong K, McMurphy S, Dean LT, et al., 2008 Differences in the patterns of health care system distrust between blacks and whites. *J. Gen. Intern. Med* 23 (6), 827–833. [PubMed: 18299939]
- Baluja KF, Park J, Myers D, 2003 Inclusion of immigrant status in smoking prevalence statistics. *Am. J. Public Health* 93 (4), 642–646. [PubMed: 12660211]
- Bansal-Travers M, Cummings KM, Hyland A, Brown A, Celestino P, 2010 Educating smokers about their cigarettes and nicotine medications. *Health Educ. Res* 25 (4), 678–686. [PubMed: 20064838]
- Benowitz NL, Henningfield JE, 2013 Reducing the nicotine content to make cigarettes less addictive. *Tob. Control* 22 (Suppl 1), i14–i17. [PubMed: 23591498]
- Berry JW, Poortinga YH, Breugelmans SM, Chasiotis A, Sam DL, 2011 *Crosscultural Psychology: Research and Applications*, 3rd ed. Cambridge University Press, Cambridge, NY.
- Bethel JW, Schenker MB, 2005 Acculturation and smoking patterns among Hispanics: a review. *Am. J. Prev. Med* 29 (2), 143–148. [PubMed: 16005811]

- Blake KD, Portnoy DB, Kaufman AR, et al., 2016 Rationale, procedures, and response rates for the 2015 administration of NCI's Health Information National Trends Survey: HINTS-FDA 2015. *J. Health Commun* 21 (12), 1269–1275. [PubMed: 27892827]
- Bonhomme MG, Holder-Hayes E, Ambrose BK, et al., 2016 Flavoured non-cigarette tobacco product use among US adults: 2013–2014. *Tob. Control* 25 (Suppl 2), ii4–ii13. [PubMed: 27794065]
- Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR, 2003 Race and trust in the health care system. *Public Health Rep.* 118 (4), 358–365. [PubMed: 12815085]
- Cantrell J, 2014 A multilevel analysis of gender, Latino immigrant enclaves, and tobacco use behavior. *J. Urban Health* 91 (5), 928–939. [PubMed: 24875580]
- Castaneda H, Holmes SM, Madrigal DS, Young ME, Beyeler N, Quesada J, 2015 Immigration as a social determinant of health. *Annu. Rev. Public Health* 36, 375–392. [PubMed: 25494053]
- Chan NL, Thompson B, Taylor VM, et al., 2007 Smoking prevalence, knowledge, and attitudes among a population of Vietnamese American men. *Nicotine Tob. Res* 9 (Suppl 3), S475–S484. [PubMed: 17978976]
- Choi S, Rankin S, Stewart A, Oka R, 2008 Effects of acculturation on smoking behavior in Asian Americans: a meta-analysis. *J. Cardiovasc. Nurs* 23 (1), 67–73. [PubMed: 18158512]
- Colby S, Ortman J, 2014 Projections of the Size and Composition of the U.S. Population: 2014 to 2060. U.S. Census Bureau, Washington, DC.
- Cooper TV, Rodriguez de Ybarra D, Charter JE, Blow J, 2011 Characteristics associated with smoking in a Hispanic college student sample. *Addict. Behav* 36 (12), 1329–1332. [PubMed: 21840646]
- Cummings KM, Hyland A, Giovino GA, Hastrup JL, Bauer JE, Bansal MA, 2004 Are smokers adequately informed about the health risks of smoking and medicinal nicotine? *Nicotine Tob. Res.* 6 (Suppl 3), S333–S340. [PubMed: 15799596]
- Denlinger-Apte RL, Joel DL, Strasser AA, Donny EC, 2017 Low nicotine content descriptors reduce perceived health risks and positive cigarette ratings in participants using very low nicotine content cigarettes. *Nicotine Tob. Res* 19 (10), 1149–1154. [PubMed: 28003507]
- Dermody SS, Donny EC, Hertsgaard LA, Hatsukami DK, 2015 Greater reductions in nicotine exposure while smoking very low nicotine content cigarettes predict smoking cessation. *Tob. Control* 24 (6), 536–539. [PubMed: 25192771]
- Donny EC, Hatsukami DK, Benowitz NL, Sved AF, Tidey JW, Cassidy RN, 2014 Reduced nicotine product standards for combustible tobacco: building an empirical basis for effective regulation. *Prev. Med* 68, 17–22. [PubMed: 24967958]
- Fagan P, Augustson E, Backinger CL, et al., 2007 Quit attempts and intention to quit cigarette smoking among young adults in the United States. *Am. J. Public Health* 97 (8), 1412–1420. [PubMed: 17600244]
- Fang CY, Ma GX, Miller SM, Tan Y, Su X, Shive S, 2006 A brief smoking cessation intervention for Chinese and Korean American smokers. *Prev. Med* 43 (4), 321–324. [PubMed: 16860858]
- Food and Drug Administration, 2017 FDA Announces Comprehensive Regulatory Plan to Shift Trajectory of Tobacco-related Disease, Death. (7 28).
- Fu SS, Burgess D, van Ryn M, Hatsukami DK, Solomon J, Joseph AM, 2007 Views on smoking cessation methods in ethnic minority communities: a qualitative investigation. *Prev. Med* 44 (3), 235–240. [PubMed: 17175016]
- Halbert CH, Armstrong K, Gandy OH, Jr., Shaker L, 2006 Racial differences in trust in health care providers. *Arch. Intern. Med* 166 (8), 896–901. [PubMed: 16636216]
- Hatsukami DK, Kotlyar M, Hertsgaard LA, et al., 2010 Reduced nicotine content cigarettes: effects on toxicant exposure, dependence and cessation. *Addiction* 105 (2), 343–355. [PubMed: 20078491]
- Hatsukami DK, Luo X, Dick L, et al., 2017 Reduced nicotine content cigarettes and use of alternative nicotine products: exploratory trial. *Addiction* 112 (1), 156–167. [PubMed: 27614097]
- Heavner KK, Rosenberg Z, Phillips CV, 2009 Survey of smokers' reasons for not switching to safer sources of nicotine and their willingness to do so in the future. *Harm Reduction J.* 6 (4), 14.
- Hu SS, Neff L, Agaku IT, et al., 2016 Tobacco product use among adults — United States, 2013–2014. *Morb. Mortal. Wkly Rep* 65 (27), 685–691.

- Kim KK, Yu ES, Chen EH, Kim J, Brintnall R, Vance S, 2000 Smoking behavior, knowledge, and beliefs among Korean Americans. *Cancer Pract.* 8 (5), 223–230. [PubMed: 11898234]
- Kim SS, Ziedonis D, Chen KW, 2007 Tobacco use and dependence in Asian Americans: a review of the literature. *Nicotine Tob. Res* 9 (2), 169–184. [PubMed: 17365748]
- Lariscy JT, Hummer RA, Rath JM, Villanti AC, Hayward MD, Vallone DM, 2013 Race/ethnicity, nativity, and tobacco use among US young adults: results from a nationally representative survey. *Nicotine Tob. Res* 15 (8), 1417–1426. [PubMed: 23348968]
- Lopez G, Bialik K, 2017 Key findings about U.S. immigrants In: *FactTank News in Numbers*. Pew Research Center.
- Lorenzo-Blanco EI, Schwartz SJ, Unger JB, et al., 2015 Latino/a youth intentions to smoke cigarettes: exploring the roles of culture and gender. *J. Lat. Psychol* 3 (3), 129–142. [PubMed: 28042523]
- Matthews AK, Sánchez-Johnsen L, King A, 2009 Development of a culturally targeted smoking cessation intervention for African American smokers. *J. Community Health* 34 (6), 480–492. [PubMed: 19728056]
- Maxwell AE, Garcia GM, Berman BA, 2007 Understanding tobacco use among Filipino American men. *Nicotine Tob. Res* 9 (7), 769–776. [PubMed: 17577806]
- McQueen A, Shacham E, Sumner W, Overton ET, 2014 Beliefs, experience, and interest in pharmacotherapy among smokers with HIV. *Am. J. Health Behav* 38 (2), 284–296. [PubMed: 24629557]
- National Cancer Institute, 2017 A Socioecological Approach to Addressing Tobacco-related Health Disparities. U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, Bethesda, MD.
- Nevid JS, Javier RA, 1997 Preliminary investigation of a culturally specific smoking cessation intervention for Hispanic smokers. *Am. J. Health Promot* 11 (3), 198–207. [PubMed: 10165099]
- Nguyen TT, McPhee SJ, Stewart S, et al., 2010 Factors associated with hepatitis B testing among Vietnamese Americans. *J. Gen. Intern. Med* 25 (7), 694–700. [PubMed: 20306150]
- Nguyen AB, Robinson J, O'Brien EK, Zhao X, 2017 Racial and ethnic differences in tobacco information seeking and information sources: findings from the 2015 Health Information National Trends Survey. *J. Health Commun* 22 (9), 743–752. [PubMed: 28762887]
- O'Brien EK, Nguyen AB, Persoskie A, Hoffman AC, 2017 U.S. adults' addiction and harm beliefs about nicotine and low nicotine cigarettes. *Prev. Med* 96, 94–100. [PubMed: 28034733]
- Pfeffer D, Wigginton B, Gartner C, Morphet K, 2017 Smokers' understandings of addiction to nicotine and tobacco: a systematic review and interpretive synthesis of quantitative and qualitative research. *Nicotine Tob. Res* 10.1093/ntr/ntx186.
- Reiss K, Lehnhardt J, Razum O, 2015 Factors associated with smoking in immigrants from non-western to western countries - what role does acculturation play? A systematic review. *Tob. Induc. Dis* 13 (1), 11. [PubMed: 25908932]
- Talhout R, Richter PA, Stepanov I, Watson CV, Watson CH, 2018 Cigarette design features: effects on emission levels, user perception, and behavior. *Tob. Regul. Sci* 4 (1), 592–604. [PubMed: 29250577]
- Tidey JW, Rohsenow DJ, Kaplan GB, Swift RM, Ahnallen CG, 2013 Separate and combined effects of very low nicotine cigarettes and nicotine replacement in smokers with schizophrenia and controls. *Nicotine Tob. Res* 15 (1), 121–129. [PubMed: 22517190]
- Tidey JW, Cassidy RN, Miller ME, 2016 Smoking topography characteristics of very low nicotine content cigarettes, with and without nicotine replacement, in smokers with schizophrenia and controls. *Nicotine Tob. Res* 18 (9), 1807–1812. [PubMed: 26995794]
- Tsang IK, Tsoh JY, Wong C, et al., 2014 Understanding and use of nicotine replacement therapy and nonpharmacologic smoking cessation strategies among Chinese and Vietnamese smokers and their families. *Prev. Chronic Dis* 11, E26. [PubMed: 24556252]
- U.S. Census Bureau Foreign born. Available at: <https://www.census.gov/topics/population/foreign-born/about.html>, Accessed date: 22 October 2017.
- Wade B, Lariscy JT, Hummer RA, 2013 Racial/ethnic and nativity patterns of U.S. adolescent and young adult smoking. *Popul. Res. Policy Rev* 32 (3), 353–371. [PubMed: 25339787]

- Wallace PM, Pomery EA, Latimer AE, Martinez JL, Salovey P, 2010 A review of acculturation measures and their utility in studies promoting Latino health. *Hisp. J. Behav. Sci* 32 (1), 37–54. [PubMed: 20582238]
- Westat, 2015 Health Information National Trends Survey 4 (HINTS 4): HINTS-FDA Methodology Report. (Rockville, MD).
- Westat, 2017 Health Information National Trends Survey 4 (HINTS 4) HINTS-FDA2 Methodology Report. (Rockville, MD).
- Wilkinson AV, Spitz MR, Strom SS, et al., 2005 Effects of nativity, age at migration, and acculturation on smoking among adult Houston residents of Mexican descent. *Am. J. Public Health* 95 (6), 1043–1049. [PubMed: 15914831]
- Wu D, Ma GX, Zhou K, Zhou D, Liu A, Poon AN, 2009 The effect of a culturally tailored smoking cessation for Chinese American smokers. *Nicotine Tob. Res* 11 (12), 1448–1457. [PubMed: 19915080]
- Yang W, Qeadan F, Smith-Gagen J, 2011 Examination of health behaviours in a dynamic population. *J. Epidemiol. Community Health* 65 (12), 1140–1144. [PubMed: 20628078]
- Yao N, Hillemeier MM, 2014 Disparities in mammography rate among immigrant and native-born women in the U.S.: progress and challenges. *J. Immigr. Minor. Health* 16 (4), 613–621 (8). [PubMed: 23430466]
- Zinser MC, Pampel FC, Flores E, 2011 Distinct beliefs, attitudes, and experiences of Latino smokers: relevance for cessation interventions. *Am. J. Health Promot* 25 (5 Suppl), eS1–15. [PubMed: 21510796]

Table 1
Demographic characteristics of US-born and foreign-born population in HINTS FDA 2015–2017.

	Total N = 5383	US-born n = 4897 (85.87%)	Foreign-born n = 486 (14.13%)	χ^2
	# (%) ^d	# (%) ^d	# (%) ^d	
HINTS-FDA cycle				
2015	50.04 (49.78; 50.31)	49.47 (48.49; 50.46)	53.49 (47.60; 59.39)	1.49, p=0.24
2017	49.96 (49.69; 50.22)	50.53 (49.54; 51.51)	46.51 (40.61; 52.40)	
Sex				
Male	48.82 (48.01; 49.64)	47.29 (45.92; 48.66)	58.31 (51.61; 65.00)	8.03, p=0.007
Female	51.18 (50.36; 51.99)	52.71 (51.34; 54.08)	41.69 (35.00; 48.39)	
Age group (years)				
18–24	10.59 (8.75; 12.43)	11.30 (9.26; 13.34)	6.66 (<0.001; 13.89) ^f	2.58, p=0.06
25–44	36.33 (34.59; 38.08)	34.44 (32.28; 36.60)	46.88 (38.23; 55.52)	
45–64	34.10 (33.68; 34.53)	34.26 (33.24; 35.27)	33.26 (26.96; 39.55)	
65 +	18.97 (18.77; 19.17)	20.01 (19.34; 20.67)	13.21 (9.70; 16.71)	
Race/ethnicity				
NH White	64.50 (64.11; 64.89)	71.62 (70.38; 72.86)	20.80 (15.23; 26.37)	92.25, p < 0.001
NH Black	12.21 (12.03; 12.40)	12.80 (12.17; 13.43)	8.63 (5.10; 12.17)	
Hispanic	15.21 (14.77; 15.66)	11.12 (9.78; 12.45)	40.37 (33.75; 46.99)	
NH other	8.07 (7.80; 8.34)	4.47 (3.69; 5.25)	30.20 (25.13; 35.26)	
Education				
High school diploma, < high school diploma or GED	31.48 (29.17; 33.80)	32.11 (29.61; 34.61)	27.58 (21.42; 33.73)	33.43, p < 0.001
Some college, vocational training	33.16 (30.87; 35.46)	35.17 (32.54; 37.81)	20.59 (14.70; 26.48)	
College graduate	22.13 (21.05; 23.20)	20.44 (19.21; 21.66)	32.70 (26.65; 38.75)	
Post graduate	13.22 (12.20; 14.25)	12.28 (11.30; 13.27)	19.13 (14.26; 24.00)	
Marital status				
Single/never been married	28.53 (27.62; 29.44)	29.87 (28.32; 31.42)	20.39 (12.73; 28.05)	6.37, p < 0.003
Married/living with a partner	56.1 (55.15; 57.06)	53.96 (52.47; 55.45)	69.13 (61.72; 76.54)	
Widowed/separated/divorced	15.37 (14.73; 16.00)	16.17 (15.28; 17.06)	10.48 (7.30; 13.67)	34.88, p < 0.001
Urban-rural status				

	Total N = 5383	US-born n = 4897 (85.87%)	Foreign-born n = 486 (14.13%)	χ^2
	# (%) ^d	# (%) ^d	# (%) ^d	
Urban	98.53 (98.05; 99.00)	98.29 (97.74; 98.84)	99.96 (99.87; 99.99)	
Rural	1.47 (1.00; 1.95)	1.71 (1.16; 2.36)	0.04 (<0.001; 0.13) ^f	0.38, p= 0.54
Health insurance				
Yes	91.58 (91.32; 91.84)	91.41 (90.87; 91.96)	92.57 (89.43; 95.70)	
No	8.42 (8.16; 8.68)	8.59 (8.04; 9.13)	7.43 (4.30; 10.57)	2.55, p= 0.04
Household income				
\$19,999	18.46 (15.57; 20.94)	19.00 (16.24; 21.77)	15.20 (9.40; 21.00)	
\$20,000–49,999	27.19 (24.23; 30.14)	26.81 (23.56; 30.06)	29.44 (22.53; 36.34)	
\$50,000–74,999	18.42 (16.66; 20.18)	18.46 (16.65; 20.27)	18.19 (12.68; 23.70)	
\$75,000–99,999	11.13 (9.72; 12.55)	11.91 (10.27; 13.55)	6.43 (3.85; 9.02)	
<\$100,000	24.80 (23.10; 26.49)	23.81 (22.12; 25.50)	30.75 (23.79; 36.70)	
Language proficiency				125.20, p < 0.001
Not at all/not well	3.00 (2.25; 3.75)	0.62 (0.11; 1.13) ^f	17.22 (13.17; 21.27)	
Well	7.81 (6.33; 9.28)	4.50 (3.46; 5.54)	27.58 (19.52; 35.64)	
Very well	89.19 (87.67; 90.72)	94.87 (93.77; 95.98)	55.21 (47.51; 62.90)	
Length of residency in the US				
1 – 10 years	3.04 (1.77; 4.31)	-	22.21 (14.02; 30.39)	
11 –20 years	3.31 (2.43; 4.18)	-	24.13 (18.13; 30.13)	
20+ years	7.35 (6.04; 8.67)	-	53.66 (45.37; 61.95)	
Born in the US	86.30 (84.58; 88.01)	100	-	3.65, p= 0.03
Current smoking status ^b				
Current smoker	14.70 (12.63; 16.78)	15.46 (13.48; 17.44)	10.01 (2.81; 17.22) ^f	
Never smoker	61.15 (58.75; 63.55)	59.40 (56.96; 61.84)	72.04 (64.91; 79.17)	
Former smoker	24.15 (22.43; 25.87)	25.15 (23.39; 26.90)	17.95 (12.86; 23.04)	

^aChi-square analyses test the association between immigrant status (foreign-born vs. US-born) and socio-demographic items.

^bCurrent smokers are those who have smoked at least 100 lifetime cigarettes and were currently smoking every day or some days; never smokers are those who have smoked less than 100 lifetime cigarettes; former smokers are those who have smoked at least 100 lifetime cigarettes and were not currently smoking.

^fIndicates instances where relative standard error (RSE) is >30% or where denominator is < 50.

Table 2
Descriptive analyses on nicotine perception and beliefs items by foreign-born status in HINTS FDA 2015–2017

	Total (N = 5385)	Born in US (n = 4897)	Foreign-born (n = 486)	Wald F ^a
Nicotine is the main substance in tobacco that makes people want to smoke...				2.89, p = 0.06
<i>Strongly Agree</i>	49.47 (47.08; 51.87)	49.45 (46.64; 52.26)	49.66 (40.96; 58.38)	
<i>Agree</i>	34.68 (32.06; 37.30)	35.65 (32.65; 38.76)	29.28 (21.96; 37.86)	
<i>Disagree</i>	2.64 (2.20; 3.24)	2.50 (1.95; 3.20)	4.09 (1.72; 9.44)	
<i>Strongly Disagree</i>	1.56 (1.01; 2.10)	1.31 (0.91; 1.89)	3.88 (1.82; 8.08)	
<i>Don't Know</i>	11.66 (10.07; 13.24)	11.10 (9.31; 13.18)	13.09 (8.27; 20.10)	
The nicotine in cigarettes is the substance that causes most of the cancer caused by smoking...				2.19, p = 0.08
<i>Strongly Agree</i>	25.76 (22.78; 28.73)	24.10 (21.18; 27.29)	35.04 (27.13; 43.86)	
<i>Agree</i>	25.17 (22.94; 27.39)	25.99 (23.32; 28.86)	21.92 (15.92; 29.39)	
<i>Disagree</i>	17.04 (15.25; 18.84)	17.87 (15.87; 20.05)	12.43 (7.82; 19.18)	
<i>Strongly Disagree</i>	9.27 (8.05; 10.49)	9.74 (8.45; 11.21)	6.53 (3.60; 11.55)	
<i>Don't Know</i>	22.76 (20.35; 25.18)	22.30 (19.91; 24.88)	24.09 (16.55; 33.69)	
Addiction to nicotine is something that I am concerned about...				3.49, p = 0.01
<i>Strongly Agree</i>	27.98 (25.11; 30.85)	26.51 (23.79; 29.41)	36.78 (28.38; 46.06)	
<i>Agree</i>	25.05 (22.67; 27.43)	25.29 (22.71; 28.07)	24.20 (16.75; 33.61)	
<i>Disagree</i>	12.34 (10.63; 14.05)	13.89 (11.98; 16.06)	5.25 (2.84; 9.51)	
<i>Strongly Disagree</i>	18.96 (16.83; 21.09)	19.18 (17.05; 21.51)	17.01 (10.02; 27.39)	
<i>Don't Know</i>	15.67 (13.99; 17.36)	15.13 (13.16; 17.33)	16.77 (11.99; 22.96)	
Overall, how addictive do you believe is...cigarette smoking?				1.30, p = 0.28
<i>Not at all addictive</i>	3.05 (2.07; 4.04)	2.83 (1.91; 4.18)	3.42 (1.46; 7.78)	
<i>Moderately addictive</i>	10.12 (8.58; 11.66)	10.79 (8.80; 13.17)	7.28 (3.97; 12.99)	
<i>Very addictive</i>	78.29 (75.71; 80.88)	78.78 (75.34; 81.85)	77.18 (68.50; 84.03)	
<i>Don't know</i>	8.54 (6.60; 11.01)	7.60 (4.94; 11.52)	12.12 (8.02; 17.92)	
Compared to a typical cigarette, would you think that a cigarette advertised as "low nicotine" would be...				0.33, p = 0.86
<i>Much less harmful...than a typical cigarette</i>	3.95 (2.58; 5.33)	3.62 (2.34; 5.55)	6.85 (2.27; 18.88)	
<i>Slightly less harmful...than a typical cigarette</i>	24.66 (22.77; 26.54)	24.88 (22.87; 27.01)	24.76 (18.06; 32.95)	
<i>Equally harmful...as a typical cigarette</i>	64.36 (61.71; 67.01)	64.83 (61.85; 67.71)	61.76 (51.94; 70.70)	
<i>Slightly more harmful...than a typical cigarette</i>	2.42 (1.66; 3.17)	2.50 (1.74; 3.57)	2.00 (1.04; 3.80)	

	Total (N = 5385)	Born in US (n = 4897)	Foreign-born (n = 486)	Wald F ^a
<i>Much more harmful... than a typical cigarette</i>	4.61 (3.38; 5.86)	4.17 (2.89; 5.99)	4.64 (1.94; 10.70)	4.60, p = 0.002
Would you think that a cigarette advertised as “low nicotine” would have... (lung cancer risk) ^b				
<i>Much lower risk of causing lung cancer than a typical cigarette</i>	3.93 (2.21; 5.63)	2.05 (1.22; 3.42)	17.59 (5.68; 43.04)	
<i>Slightly lower risk of causing lung cancer than a typical cigarette</i>	18.37 (15.29; 21.46)	19.61 (16.14; 23.61)	10.72 (6.62; 16.90)	
<i>Equal risk</i>	71.77 (68.08; 75.46)	71.95 (67.17; 76.27)	67.95 (48.25; 82.67)	
<i>Slightly higher risk of causing lung cancer than a typical cigarette</i>	1.62 (0.52; 2.72)	1.67 (0.77; 3.60)	1.36 (< 0.01; 8.65)	
<i>Much higher risk of causing lung cancer than a typical cigarette</i>	4.31 (2.71; 5.90)	4.73 (2.32; 9.39)	2.39 (0.45; 11.62)	
Compared to a typical cigarette, would you think that a cigarette advertised as “low nicotine” would be...				0.36, p = 0.84
<i>Much less addictive than a typical cigarette</i>	3.33 (2.45; 4.21)	2.95 (2.21; 3.94)	5.09 (1.07; 21.03)	
<i>Slightly less addictive than a typical cigarette</i>	26.83 (24.75; 28.91)	27.56 (25.10; 30.17)	22.63 (16.10; 30.83)	
<i>Equally addictive as a typical cigarette</i>	63.62 (61.17; 66.07)	63.32 (60.39; 66.15)	66.33 (57.10; 74.47)	
<i>Slightly more addictive than a typical cigarette</i>	2.23 (1.45; 2.97)	2.24 (1.54; 3.24)	2.34 (1.07; 5.05)	
<i>Much more addictive than a typical cigarette</i>	3.99 (2.89; 5.10)	3.93 (2.57; 5.96)	3.62 (1.29; 9.72)	
How believable is it that a cigarette could be “low nicotine”?				2.34, p = 0.08
<i>Not at all</i>	41.41 (38.66; 44.22)	40.56 (37.45; 43.75)	44.51 (35.73; 53.65)	
<i>A little believable</i>	34.51 (32.10; 38.92)	36.08 (33.22; 39.05)	26.87 (20.49; 34.37)	
<i>Somewhat believable</i>	19.19 (17.22; 21.17)	19.32 (17.24; 21.58)	19.44 (13.39; 27.36)	
<i>Very believable</i>	4.89 (3.63; 6.15)	4.04 (3.10; 5.26)	9.18 (4.09; 19.33)	

^aWald-F analyses test the association between foreign-born status (foreign-born vs. US-born) and nicotine and addiction belief items while djusting for racial ethnic membership.

^bItem is only available for HINTS-FDA 2017.

Table 3
Correlates of nicotine perception/belief items among the foreign-born in HINTS FDA 2015–2017.

	Race/ethnicity		English proficiency					Length of residency in the US		
	NH-White B (95% CI)	NH-Black B (95% CI)	Hispanic B (95% CI)	Other B (95% CI)	Not at all B (95% CI)	Well B (95% CI)	Very well B (95% CI)	1–10 years B (95% CI)	11–20 years B (95% CI)	20+ years B (95% CI)
The nicotine in cigarettes is the substance that causes most of the cancer caused by smoking... ^a	Ref	0.37 (-0.13; 0.87)	-0.17 (-0.65; 0.32)	-0.06 (-0.48; 0.37)	0.21 (-0.34; 0.76)	0.43 (0.13; 0.74)	Ref	-0.42 (-0.86; 0.02)	<0.001 (-0.40; 0.40)	Ref
Overall, how addictive do you believe cigarette smoking is? ^b	Ref	0.09 (-0.10; 0.27)	0.08 (-0.15; 0.31)	-0.09 (-0.35; 0.16)	-0.13 (-0.42; 0.16)	0.01 (-0.14; 0.16)	Ref	0.05 (-0.16; 0.25)	0.17 (0.06; 0.32)	Ref
Compared to a typical cigarette, would you think that a cigarette advertised as “low nicotine” would be... (more harmful) ^c	Ref	0.62 (0.04; 1.19)	0.56 (0.12; 1.00)	0.25 (-0.12; 0.62)	0.02 (-0.43; 0.47)	0.29 (-0.001; 0.59)	Ref	0.08 (-0.36; 0.52)	-0.20 (-0.49; 0.08)	Ref
Compared to a typical cigarette, would you think that a cigarette advertised as “low nicotine” would be... (more addictive) ^d	Ref	0.72 (0.14; 1.31)	0.48 (0.12; 0.84)	0.19 (-0.16; 0.54)	0.23 (-0.14; 0.60)	0.50 (0.25; 0.76)	Ref	0.02 (-0.36; 0.40)	-0.09 (-0.41; 0.23)	Ref
How believable is it that a cigarette could be “low nicotine”? ^e	Ref	-0.61 (-1.04; -0.18)	-0.04 (-0.47; 0.40)	-0.29 (-0.63; 0.05)	-0.18 (-0.70; 0.34)	-0.11 (-0.46; 0.24)	Ref	0.28 (-0.10; 0.66)	0.03 (-0.39; 0.45)	Ref

Note. Cross-tabulation analyses were utilized to examine the bivariate associations among demographic covariates (age, sex, insurance status, urban/rural region, marital status, educational attainment, household income, and HINTS-FDA cycle) and current smoking status with that of nicotine belief items. Variables that were significantly (< 0.05) associated with nicotine belief items were selected as independent variables and adjusted for in the regression models.

^aResponse categories included 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, and 4 = *Strongly Agree*. *Don't Know* responses were excluded from the analyses.

^bResponse categories included 1 = *Not at all addictive*, 2 = *Moderately addictive*, and 3 = *Very addictive*. *Don't Know* responses were excluded from the analyses.

^cResponse categories included 1 = *Much less harmful*, 2 = *Slightly less harmful*, 3 = *Equally harmful*, 4 = *Slightly more harmful*, and 5 = *Much more harmful than a typical cigarette*.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

^dResponse categories included 1 = *Much less addictive*, 2 = *Slightly less addictive*, 3 = *Equally addictive*, 4 = *Slightly more addictive*, and 5 = *Much more addictive to your health than a typical cigarette?*

^eResponse categories included 1 = *Not at all believable*, 2 = *A little believable*, 3 = *Somewhat believable*, and 4 = *Very believable*.